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Headrest for a Seat

The invention relates to a headrest for a seat, preferably a passenger seat, in particular an aircraft passenger seat, having at least one tilt adjusting mechanism and one height adjusting mechanism for adjusting the tilt or the height of the headrest relative to the backrest of the seat on which the headrest may be mounted, a pivot shaft for the respective tilt adjustment of the headrest being mounted on an associated guide component facing away from the headrest. This guide component, which is displaceable, operates in conjunction with a longitudinal guide and together with this component makes up the height adjustment component.

A generic headrest of the state of the art has been disclosed in WO 95/09742. The headrest described in this document has a tilting and a height adjustment mechanism for adjustment of the tilt and accordingly height of the headrest relative to the backrest of a seat. The adjustment mechanisms for tilt and height are mounted on the rear side of the headrest facing away from the seat occupant and are partly integrated with the backrest of the respective seat. The longitudinal guides for the height adjustment mechanism are a component of the backrest

and are rigidly connected to the frame structure of this backrest. The pivot shaft about which the headrest moves as its tilt is adjusted is positioned in the plane formed by the longitudinal guides and is correspondingly repositioned vertically when the height of the headrest is adjusted. The components of the tilt and height adjustment mechanism are mounted in the central area of the headrest, so that the potential tilt adjustment range, in particular, is reduced by the disclosed solution.

On the basis of this state of the art the object of the invention is improvement in the disclosed headrest to the end that the overall design cost will be lowered and at the same time the height and tilt adjustment options will be increased.

It is claimed that this object is attained by means of a headrest having the features specified in patent claim 1 in its entirety. In that, as is specified in the characterizing part of claim 1, the longitudinal guide is an integral component of the headrest and in that the pivot shaft of the respective guide component is mounted so as to be stationary relative to the backrest, the design of the backrest structure can be greatly simplified, since no reinforcing structures or guide rails are needed on the frame of this structure for the mounting of a headrest and the height and tilt adjustment options for this headrest relative to the backrest are substantially increased. Thus, the headrest with its lower side may be pulled out as far as the pivot mechanism for adjustment of tilt, with the result that no parts of the headrest may now collide with the backrest, a situation which results in corresponding limitation of the potential adjustments.

In one preferred embodiment of the headrest claimed for the invention the height adjustment mechanism is mounted between the pivot shaft for tilt adjustment of the headrest and the side of the headrest facing away from the seat occupant. Optimization of the tilt of the headrest to extreme tilt angles is thereby achieved.

In another preferred embodiment of the headrest claimed for the invention the height adjustment mechanism has a catch positioning mechanism. In this way the headrest may be adjusted repeatedly and simply to specific assigned or assignable height positions. In one especially preferred embodiment the catch positioning mechanism has in the longitudinal guide a spacing component with recesses into which a prestressed catch component of the guide component may be engaged. The at least partial integration of the catch positioning mechanism with the longitudinal guide results in an especially compact and accordingly space-saving configuration of the height adjustment mechanism.

In one especially preferred embodiment of the headrest claimed for the invention the height adjustment mechanism has at least one energy accumulator component, in particular in the form of a tension spring which extends along the respective longitudinal guide and is articulated with a point of application on the guide component and with another point of application in the area of the lower side of the headrest. The energy accumulator component supports the movement of adjustment in the direction opposite the direction of gravity (upward) during height adjustment of the headrest. In one particular cost-effective embodiment the energy accumulator component is in the form of at least one tension spring. Extension along the longitudinal guide results in optimal transfer of force from the energy accumulator component to the headrest, along with avoidance of the presence of a cantilever on the guide component, which may result in jamming of the guide component in the longitudinal guide and accordingly poor controllability of the height adjustment mechanism.

In another preferred embodiment the guide component has a recess for the energy accumulator component such that the energy accumulator component is integrated with the guide component when the headrest is in the fully extended position. Optimal utilization of the adjustment path for the height adjustment is thereby ensured.

In one especially preferred embodiment of the headrest claimed for the invention a receiving component detachably connected to the headrest serves as the area of contact of the energy accumulator component in the area of the lower side of the headrest. The energy accumulator component or the height adjustment mechanism is thus accessible at low cost on the occasion of maintenance or cleaning.

In another preferred embodiment the headrest is provided with two side components which may be mounted in assignable angular positions relative to a base component and by way of a locating mechanism, a catch mechanism in particular. The other potential adaptations of the headrest provided by the side components represent a considerable gain in comfort for the seat occupant. The adjustment of the side components to assignable angular positions simplifies operation in the adjustment process and a catch mechanism permits retention of a selected adjustment once it has been made, so that no undesirable displacement of the side components takes place.

In another advantageous embodiment of the headrest the pivot shaft is in the form of a friction coupling on the guide component and a fastening position for the headrest is connected to the guide component by way of the friction coupling on the backrest. The friction coupling permits continuous adjustment of the tilt of the headrest. In that the friction coupling connects the guide component to a fastening position for the headrest on the backrest, a very compact structure is provided, one such that only slight leverage is applied to the individual components. The mechanical stability under load of the height and tilt adjustment mechanism is as a result very high and in the event of application of a heavy load, such as impact of a head, the forces introduced can be reliably absorbed and without great discomfort to the head.

In one especially preferred embodiment the base component and the two side components are in the form of laminar molded elements; this permits cost-effective production of these

components. Reduction in weight with no significant loss of stability may be achieved by means of suitably selected recesses in the laminar components.

In another preferred embodiment of the headrest the base component has a central recess and the height and tilt adjustment mechanisms extend on both sides next to the central recess along the base component facing the two side components. In addition to the weight reduction, the central recess provides, in particular, improved impact protection for the rear of the head of the seat occupant in the event of an accident, since there are no hard or sharp-edged structures of any nature under the headrest padding which might lead to a head injury. The height and tilt adjustment mechanism is accordingly mounted on both sides next to the central recess along the base component facing the two side components.

One especially preferred embodiment of the headrest is characterized in that a lighting fixture is mounted in the padding of at least one of the two side components. Significant increase in comfort is provided by the associated options for individual adaptation to the needs of a seat occupant.

The headrest claimed for the invention is described in detail in what follows with reference to an embodiment illustrated in the drawing, in which, in diagrammatic form not drawn to scale,

FIGS. 1a to 1g show the headrest claimed for the invention in different tilt and height adjustments relative to the backrest of a seat,

FIG. 2 shows the headrest without padding and cover material in an overall view diagonally from the rear, and

FIG. 3 shows the headrest without padding and cover material in an overall view diagonally from the front.

FIGS. 1a to 1g shown the headrest 1 claimed for the invention in different tilt and height adjustments relative to a backrest 2 of a seat 3. In FIG. 1a the headrest 1 is presented in a base position such that it assumes an intermediate height and such that the longitudinal axis 4 of the headrest is oriented in parallel with the longitudinal axis 5 of the backrest. In FIGS. 1b to 1d the headrest 1 assumes a positive angle of inclination α and in FIGS. 1e to 1g a negative angle of inclination β. The figures in question clearly illustrate the multiplicity of different potential adjustments.

FIG. 2 shows the headrest 1 without padding and cover material in an overall partly exploded view obliquely from the rear. The headrest 1 has a base component 6 on which two side components 7 are hinge-mounted. The rotating motion of the side components 7 relative to the base component 6 may be stopped in the position desired by the seat occupant by a locking mechanism 8. The locking mechanism 8 may for this purpose be designed as a catch mechanism in which a mechanically prestressed catch (one mounted on an armature component of the base component 6) is engaged in assignable recesses or cavities in a guide bar, this making it possible to place the side components 7 in assignable angular positions relative to the base component 6. The locking mechanism 8 may also be configured so that the side components 7 may be adjusted to any desired angular position relative to the base component 6. With this solution, the side components 7 may be kept in a desired position exclusively by the static friction occurring in the locking mechanism 8 or additionally by the stopping action of a locking mechanism (not shown).

The base component 6 and the side components 7 are laminar molded components in the configuration shown in FIG. 2. They may consist of a plastic or a metal, in particular a light

metal such as aluminum. The molded components have openings 9, which among other things serve the purpose of weight reduction. The base component 6 has an opening in the form of a central recess 10 on both sides of which a height and tilt adjustment mechanism (designated as a whole as 11) is mounted in the direction of the side components 7. In this way the area of the central recess 10 in the base component 6 is kept entirely clear of hard or sharp-edged structures which could result in injuries in the event of hard impact of the head on the headrest. A tubular frame design or a combination of these alternatives is also possible in place of a laminar configuration of the base component 6 and the side components 7.

The height adjustment mechanism 12 has a longitudinal guide 13, along with a guide component 14 and a catch positioning mechanism 15. The longitudinal guide 13 extends in parallel with the longitudinal axis 4 of the head rest on both sides of the central recess 10 of the base component 6. The longitudinal guide 13 has a clamp-shaped profile in cross-section, such as a double C profile, so that the guide component 14 is securely retained. The catch positioning mechanism 15, which in the configuration shown in FIG. 2 has a spacing component 16 with recesses 17 in which a prestressed catch component 18 of the guide component 14 may be engaged, is integrated with the longitudinal guide 13. The spacing component 16 may be a strip of metal or plastic near which the recesses 17 in the form of through borings or cavities are positioned. The prestressed catch component 18 may be cost-effectively and reliably configured as a catch with spring-loaded ball. However, application of mechanical prestressing to the catch may also be effected by hydraulic, pneumatic, or magnetic means. The height adjustment mechanism 12 may have as another component an energy accumulator component 19 which supports the height adjustment process in movement of the headrest upward.

The energy accumulator component 19 extends along the respective longitudinal guide 13 and is coupled with a point of application 20 on the guide component 14 and with another point of application 21 in the area of the lower side of the headrest.

In the embodiment shown in FIG. 2 the point of application 20 on the guide component 14 is in the form of a connecting component 22, which, however, may be omitted in another embodiment, so that the energy accumulator component 19 engages the guide component 14 directly. The point of application 21 in the area of the lower side of the headrest 1 is in the form of a seating component 23 which is detachably connected to the headrest 1. For the purpose of connecting the seating component 23 to the headrest 1, to the longitudinal guide 13 in particular, the seating component 23 may have securing means 24, which in the exemplary embodiment shown in FIG. 2 is a sort of splint but may otherwise also be in the form of a screw or a dowel pin.

The energy accumulator component 19 in the embodiment shown in FIG. 2 is in the form of a helical spring; this represents a very cost-effective and very easy solution. In other configurations the energy accumulator component 19 may also embodied as a hydraulic or pneumatic pressure accumulator component. The longitudinal guide 13 and the guide component 14 are configured so that the former encloses the latter at least in part or conversely and so that movement of the two components relative to each other may occur in the main only in the direction determined by the longitudinal axis of the guide 13.

When the headrest 1 is positioned at a minimal height relative to the backrest 2, as is illustrated on the left side in FIG. 2, the guide component 14 is positioned at the upper end 25 and the energy accumulator component 19 is prestressed from its neutral position so that the energy accumulator component 19 actively supports movement upward during height adjustment of the headrest 1.

When the headrest 1 is in the position of maximum height adjustment relative to the backrest 2, the seating component 23 is near the lower side facing it of the guide component 14 or rests at least in part on it. In the latter case the guide component 14 may simultaneously

assume the function of a catch on the upper end of the displacement path of the height adjustment mechanism 12. However, a catch may also be configured as a hydraulic or pneumatic embodiment of the energy accumulator component 19.

The surfaces of the longitudinal guide 13 and the guide component 14 facing each other have on at least one of these components a groove-like recess 26 which extends in parallel with the longitudinal direction of the longitudinal guide 13. The energy accumulator component 19 mounted in parallel with this guide is seated at least in part in the groove-like recess 26 and, in particular in the position of maximum height adjustment of the headrest 1 relative to the backrest 2, seated entirely or at least substantially between the longitudinal guide 13 and the guide component 14. In a preferred configuration the guide component 14 has the groove-like recess 26 and on the whole is designed so that the energy accumulator component is seated in its entirety in the guide component 14 when the headrest 1 is in the fully extended position.

The longitudinal guides 13 are mounted on both sides of the central recess 10 of the base component 6 on the side of the headrest facing away from a seat occupant and accordingly an integral component of the headrest 1. As a result, the tilt adjustment mechanism 27 is mounted so as to be stationary relative to the backrest 2 or variable in height relative to the headrest 1, so that the options for adjustment of the tilt of the headrest 1 relative to the backrest 2 are greatly increased. Optimal configuration of these relationships is achieved if the height adjustment mechanism 12 is mounted between the side of the headrest 1 facing away from the seat occupant and a pivot shaft 28 for adjustment of the tilt of the headrest 1.

In the embodiment shown in FIG. 2 the pivot shaft 28 is in the form of a friction coupling 29 on the guide component 14, as a result of which continuous adjustment of the tilt of the headrest 1 is made possible. The guide component 14 is connected by way of the friction coupling 29 to a fastening point 30 on the backrest 2. A motor-driven mechanism rather than the

friction coupling 29 may also assume the function of connecting headrest to backrest and of locking the headrest 1 in the position desired. Especially to be preferred is use of a so-called hydrolock which permits continuous height adjustment, in which case application of force by the seat occupant is required only for adjustment of the movement of the headrest 1 downward, while the hydrolock performs the work required for the purpose in upward adjustment of the headrest.

FIG. 3 shows the headrest 1 without padding and covering in an overall view diagonally from the front. The entire side of the headrest facing the seat occupant is very smooth and even, since all components of the height and tilt adjustment mechanism 11 are mounted on the side of the headrest 1 facing away from the seat occupant. The central recess 10 in the base component 6 is kept completely free of components of any kind, as a result of which injuries are prevented in this area in the event of impact on the head. The upper edge 31 of the base component 6 extends somewhat to the rear relative to a seat occupant, so that it is somewhat farther away from a seat occupant than the lower edge 32 of the base component 6. Consequently, the base component 6 already has an ergonomically preshaped outline, so that less padding material need be expended overall for ergonomic configuration of the headrest 1.

As the foregoing exposition makes clear, the tilt pivot is positioned to the front of the guide rail, so that different tilt angles are obtained. Since the longitudinal guide for them are integrated into the headrest, the headrest may be secured on the backrest 2 by way of a retaining clip 33 which is associated with the respective headrest. Since the backrest 2 consequently has no longitudinal guide of its own, there are no slots to be seen in the backrest padding, this correspondingly improving seating comfort, since no otherwise customary slot guide is to be detected in the backrest even when the headrest is raised completely to its highest position.

The headrest may also be rapidly replaced by way of the retaining clips 33, which may be secured on the tilt adjustment mechanism by way of the friction coupling 29. Another replacement possibility is represented by removal, after detaching the securing means 24 in the shape of a securing bolt, of the headrest with its longitudinal guides 13 from the backrest 2; the height and tilt adjustment mechanism 11 then remains stationary on the backrest 2. In one embodiment not shown the height adjustment mechanism 12 may be in the form of the respective longitudinal guide 13 itself. In the case in question the recesses 17 are integrated directly into the longitudinal guide. As a result of employment of the spacing component 16 as an independent component the latter may nevertheless be designed to be rugged for engagement of the detent sphere; for example, it may consist of a steel material which is subject to low wear, but otherwise the longitudinal guide 13 may made directly of a light plastic material.